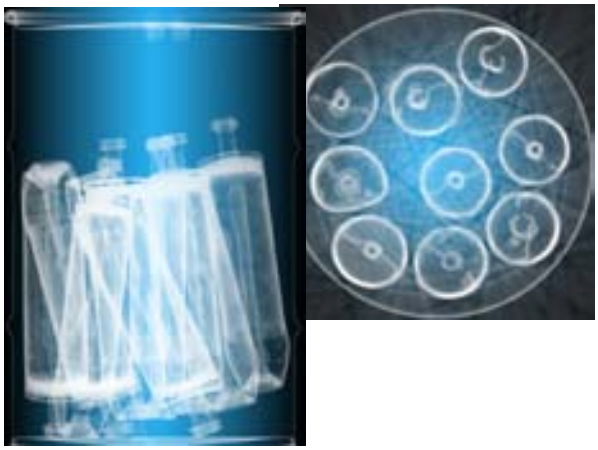
Digital Radiography/Computed Tomography

Description

The Digital Radiography and Computed Tomography (DRCT) laboratory performs research and development in 2-D and 3-D x-ray imaging. During the past eight years the lab has developed several x-ray imaging and image processing systems for the Departments of Energy and Defense. The DRCT lab has also performed research in 3-D cone beam tomography and has developed methods for system characterization leading to improved image quality, especially in portable imaging systems. A wide range of system types and capabilities have been developed.

System Functions

All system functions on our scanners can be controlled remotely up to 300 feet. On the portable singles scanner, a conventional digital x-ray of a munition or over-pack, up to 30 centimeters in diameter and 1 meter long, can be produced in less than two minutes. A two-dimensional tomographic slice at any height on the munition can be produced in less than one minute, while full 3-D images may be generated in about 10 minutes. Likewise, scanning an 85-gallon drum on a field-portable system designed for large containers can be achieved in about five minutes.



The images above show a digital radiograph and computed tomgraphy slice of a 55-gallon drum acquired with a large scanner. The radiograph shows several munitions within the drum. The CT slice reveals the number of munitions (nine in this drum). The images also help determine the presence and status of fuzes, burster, munition walls, or liquid. The image reveals a misshapen munition and a buildup of materials (probably corrosion) on the inside wall.

Capabilities of X-ray Imaging Systems

X-ray systems

DR with scanning 1-d linear arrays

DR with 2-D area arrays

2-D multiple slice CT

3-D Spiral CT

3-D Cone Beam CT

Real-time Radiography

Isotopic CT and Densitometry

Energy range from 30kVp to 4MeV

Large range of object size and image resolution

Objects from 1mm to 1.5m diameters, 1.5m height

50-100 micron resolution for objects up to 2cm

0.5-2.0 mm resolution for larger objects

12-16 bit dynamic range

INEEL-developed image acquisition, processing, analysis and display software

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